



# Risk Factors for Urinary Tract Infections in Patients Who Underwent Transurethral Prostatectomy

## Transüretral Prostatektomi Uygulanan Hastalarda Üriner Enfeksiyon için Risk Faktörleri

Transurethral Prostatectomy and Infection

Salih Budak<sup>1</sup>, Gökçen Gürkök Budak<sup>2</sup>, Evrim Emre Aksoy<sup>3</sup>, A.Emrah Sonbahar<sup>4</sup>, Tufan Süelözgen<sup>1</sup>, Tansu Değirmenci<sup>5</sup>, Bülent Günlüsoy<sup>5</sup>  
<sup>1</sup>Tepecik Eğitim Araştırma Hastanesi, Üroloji Kliniği, İzmir, <sup>2</sup>Tire Devlet Hastanesi, Enfeksiyon Hastalıkları Kliniği, İzmir, <sup>3</sup>Kırkağaç Devlet Hastanesi, Üroloji Kliniği, Manisa, <sup>4</sup>Geyve Devlet Hastanesi, Üroloji Kliniği, Sakarya, <sup>5</sup>İzmir Eğitim ve Araştırma Hastanesi Üroloji Kliniği, İzmir, Türkiye

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### Özet

**Amaç:** Transüretral prostat rezeksiyonu (TURP) benign prostat hiperplazisinin (BPH) cerrahi tedavisinde hala altın standarttır. Üriner sistem enfeksiyonu bu işlemin arzu edilmeyen komplikasyonlarından biridir. Bu çalışmanın amacı TURP sonrası gelişen nozokomiyal üriner sistem enfeksiyonların oluşmasından sorumlu olan risk faktörlerini incelemektir. **Gereç ve Yöntem:** Ocak 2008-Haziran 2009 tarihleri arası BPH tanısıyla TUR-P uygulanan yaş ortalaması 67.5±14.1 (49-87 arası) olan 175 hasta çalışmaya dahil edildi. Hastalar nozokomiyal üriner enfeksiyonu olanlar (ÜSE) ve olmayanlar şeklinde 2 gruba ayrıldı. Gruplar preoperatif PSA düzeyleri, prostat biyopsisi, operasyon süresi, rezeke edilen doku miktarı, hastanede kalış süresi ve preoperatif kataterizasyon açısından karşılaştırıldı. **Bulgular:** Otuzdört (%19,4) hasta nozokomiyal ÜSE saptandı. Nozokomiyal ÜSE grubunda preoperatif kataterizasyonu (p=0,01) risk faktörü açısından istatistiksel olarak anlamlı bulduk. PSA, prostat biyopsisi, operasyon süresi, hastanede kalış süresi ve rezeke edilen doku miktarıyla postoperatif nozokomiyal ÜSE arasında anlamlı bir ilişki tespit etmedik. **Tartışma:** BPH nedeniyle TURP planlanan kataterizasyonu olan hastalar ayrıntılı biçimde incelenmelidir. Özellikle de preoperatif dönemde kataterizasyonu hastalar operasyon sonrası enfeksiyon açısından yakından takip edilmelidir.

### Anahtar Kelimeler

Benign Prostat Hiperplazisi; Transüretral Prostatektomi; Nozokomiyal Enfeksiyon

### Abstract

**Aim:** Transurethral resection of prostate (TURP) is still the gold standard in the surgical treatment of benign prostatic hyperplasia (BPH). Urinary tract infection is an unwilling complication after the procedure. The aim of this study is to evaluate the risk factors which are responsible for the occurrence of nosocomial urinary system infection (NUSI) after TURP. **Material and Method:** A total of 175 patients with a mean age of 67.5±14.1 years (ranged from 49 to 87 years) underwent transurethral prostatectomy for BPH in between January 2008 and June 2009. After the patients were divided two groups as NUSI and non-NUSI, Analyzse of the clinical parameters of preoperative PSA, previous prostate biopsy, operation time, resected tissue weight, hospitalization period and preoperative catheterization with the nosocomial urinary system infections was done. **Results:** NUSI was found in thirty-four (19.4%) patients. Preoperative catheterization (p=0.01) were found as the statistically significant risk factors in the group with nosocomial USI. There was no statistically significant correlation between the PSA, prostate biopsy, operation time, hospitalization period and resected tissue weight with the development of postoperative NUSI. **Discussion:** The patients with catheterization who are candidates of transurethral prostatectomy for the treatment of BPH should be examined detaily preoperatively period. Especially the patients who were preoperative catheterization should be followed up after the treatment for postoperative infection.

### Keywords

Benign Prostatic Hyperplasia; Transurethral Prostatectomy; Nosocomial Infection

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Corresponding Author: Salih Budak, 206/26 Sok. No:16 D:24 Yıldız Mah. Buca, İzmir, Türkiye.

GSM: +905052639870 E-Mail: salihbudak1977@gmail.com

## Introduction

Despite the new minimal invasive surgeries, transurethral resection of prostate (TURP) is still the gold standard in the surgical treatment of benign prostatic hyperplasia [1] The mortality and morbidity rates decreased in years in parallel to the development of surgical technique and technological improvements. [2] However, although surgical principles for asepsis and anti-sepsis are followed, the infections triggered in the perioperative period might result in the increase of hospitalization period, increase in the cost, development of morbidity, sepsis through systemic distribution and even death. [3] Knowing the effective risk factors in nosocomial urinary system infection (NUSI) after the TURP might cause avoiding from those risk factors and decrease the NUSI rates.

In this study, we aimed to determine the risk factors which facilitate the development of nosocomial urinary system infection after the transurethral prostatectomy and to contribute to the development of true approaches for the struggle of NUSI developed after TURP.

## Material and Method

A total of 175 patients with a mean age of  $67.5 \pm 14.1$  years (ranged from 49 to 87 years) who underwent TURP in between January 2008 and June 2009 were retrospectively analyzed. Before the operation, routine blood tests, coagulation tests and urine cultures were performed. The criteria to include to the study was being a male patient who was hospitalized in our service with a BPH diagnosis and planned to have TURP operation, having a prostate with a volume of under 100 cc according to urinary ultrasonography and not having a surgical contraindication. The exclusion criteria were accepted as having a diagnosed prostate cancer, a history of transurethral surgery and an accompanying immunosuppressor disease (malignancy, DM). The patients were evaluated for the clinical symptoms and biochemical results. The observation form which is used prior to the operation consisted of the parts of preoperative factors which might be risky in the development of urinary system infection such as prostate biopsy, preoperative catheterization, preoperative prostate specific antigen (PSA) levels, operation time, hospitalization period and age.

All the infections were described according to the "Center for disease control and prevention" CDC criteria.[13] The daily body temperature, the maintenance time of suprapubic and transurethral catheters, daily physical examination results, side effects, postoperative complications were recorded. The fever was described as 38 OC and above. The additional urinary and blood cultures were obtained from the patients having fever and infection symptom results.

In the antibiotic prophylaxis, the first generation cephalosporin (Cefazolin) was administered intravenous 30 minutes before the TURP operation. Indwelling catheter was removed shortly after the operation and closed drainage system was used. The urinary culture (middle flow or catheter) was obtained before 2 days of the planned surgery and 3-7 days after the completion of postoperative antibiotic treatment. Maximum two types of microorganisms' proliferation as  $10^5$  "colony forming units (CFU)/ml or above was accepted and statistically significant.

By transferring the results obtained from the study to SPSS for

Windows 13.0 (Statistical Package for Social Sciences), the independent samples t test and chi-square tests were performed for the statistical evaluation.  $p < 0.05$  was accepted as statistically significant.

## Results

Of the 175 patients included to the study, 34 (19.4%) had the urinary nosocomial urinary infection. The results which show the correlation between the described risk factors and nosocomial urinary system infection are summarized in table 1.

Table1. Risk factors and nosocomial urinary system infections

Risk Factors	Total (n=175)	USI+ (n=34)	USI-(n=141)	p
PSA	4.8	5.6	4.1	0.24 <sup>a</sup>
Prostate biopsy (%)	23.4 (n=41)	20.5 (n=7)	24.1 (n=34)	0.25 <sup>b</sup>
TURP duration (minute)	55(10-115)	64 (25-115)	48(10-100)	0.32 <sup>a</sup>
Resected weight (gram)	29.8 (5-92)	29.1(5-86)	30.1(7-92)	0.47 <sup>a</sup>
Hospitalization period (day)	2.3(1-16)	2.6(1-16)	2.2(1-14)	0.7 <sup>a</sup>
Patient with permanent catheter (%)	24.9 (n=43)	47.1 (n=16)	19.1 (n=27)	0.01 <sup>b</sup>
Age, average	67.5(49-87)	68.9(53-86)	67.1 (49-87)	0.06 <sup>a</sup>

a independent samples t test b chi square test

When we look at the analyzed risk factors, the preoperative urethral catheter use were found as significant risk factors for postoperative nosocomial infection development (Table 1). Also, when the results of patients who underwent transrectal prostate biopsy due to malignancy suspicion before the operation were analyzed, there was no correlation between the prostate biopsy and postoperative nosocomial USI ( $p=0.250$ , chi-square test).

The nosocomial urinary system infection agent microorganisms were evaluated after TURP, E.coli (31.7%) was determined as the most frequent agent (Table 2).

Table 2. The distribution of the microorganisms which are the nosocomial urinary system infection agent

	N(41)	%
Escherichia coli	13	31.7
Klebsiella spp.	7	17.1
Pseudomonas Aeruginosa	4	9.7
Enterococcus spp.	4	9.7
Candida spp.	3	7.3
Others	10	24.3

## Discussion

Benign Prostatic Hyperplasia (BPH) is a commonly seen problem in the male population especially over the age of 50. [4] The 25% of the men receive medical or surgical treatment due to BPH up to age of 80. [5,6] Despite a number of described new methods, transurethral resection (TURP) of the prostate keeps its place for long years in the surgical treatment of BPH. [1] In spite of the fact that a number of surgical procedures applied for the BPH were regressed in USA and Europe, [7] it is still in the second place of the major surgeries administered to males. [8] As a result, 3 out of 10 males might receive surgery becau-

se of this disease. [9]

The infections which are developed after hospitalization or seen after the coming out of the hospital are described as nosocomial infections (NI). [10] NUSI is the most commonly seen complication of the TURP. The nosocomial urinary system infection due to TURP incidence varies between 2% and 25%. But NUSI can reach up to 60% rates even in the patients with negative urinary culture. [11,12] The risk factors for the NUSI development after TURP operation are complicated and multifactorial. The risk factors which would affect the postoperative complication rates for TURP are reported as prostate size, histology, prostatectomy duration, preoperative bacteriuria, catheterization, surgeries applied simultaneously, previous prostate surgery. [13,14,16,17] When we look at our study, preoperative catheter use among those factors are the significant risk factors in terms of postoperative nosocomial infection development. In the literature, existence of urinary catheter was found as the most important risk factor for the nosocomial infection. [13,14,15,16]

Although the nosocomial urinary system infection agent microorganisms show variance in the literature, the most commonly seen agent microorganism is reported as E.coli. [12-16,18] An increased multiple antibiotic resistance and in particular increased resistance against quinolones of E. coli is reported. [16,17] Similarly, in our study, E. Coli was the most frequently isolated bacteria, 41 agent microorganisms were isolated in the patients who developed USI. Different from the literature, the rates of gram-positive and gram-negative bacteria were close to each other. The agent microorganism in 3 of the USI episodes were also analyzed by isolating from blood cultures and evaluated as bacteremia secondary to the USI. Those agent microorganisms were determined as E. coli, Klebsiella spp. and Proteus vulgaris. By the monitoring of the NUSI, it is possible to determine the resistance that changes in each hospital. Thus, effective antibiotic choice, reducing the resistance development and decreasing the costs might be provided.

Still, the gram-positive and gram-negative bacteria are accepted as important in the nosocomial urinary system infections and the use of broad spectrum antibiotics use is advised. However, it is known that the fungal infections increased due to those treatments and Candida species is reported as the most frequently isolated fungus from the urinary cultures. [19,20] In our study, Candida species were isolated at a rate of 7.3% among the NUSI agents. In the literature, the frequently determined risk factors in NUSI due to Candida species are reported as urinary catheter administration, diabetes mellitus, broad spectrum antibiotic use, advanced age, radiotherapy, immunosuppression, occlusion of urinary flow. [21]

This process should be immediately administered to the patients with preoperative catheterization and received surgical treatment indication. Especially, the patients who were diagnosed with preoperative catheterization should be followed up after the treatment due to postoperative infection risk. Different risk factors should be considered for each patient before and after the TURP operation. The culture results should be a guide for the operation before and after the treatment.

## Competing interests

The authors declare that they have no competing interests.

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